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THE BUYING POWER OF LABOR DURING THE WAR

By Alvin H. Hansen, *University of Minnesota*

During the war it was the general opinion that the wage-earning class was spending money more freely and living more extravagantly than in the pre-war days. This popular belief would imply that the buying power of labor as a class had increased, that their money incomes had risen faster than retail prices and the cost of living. In answer to this wide-spread current opinion statistics have often been adduced to show that wage rates lagged behind the cost of living. But wage rates do not tell the story of working-class incomes. Because wage rates lagged behind the cost of living it by no means follows that the buying power of the wage-earning class decreased.

In considering the buying power of the wage-earning population we are concerned with total earnings, not with wage rates. Wage rates, of course, affect earnings, but there are many other factors of equal importance such as (1) short-time or over-time, (2) over-time bonuses, (3) steady employment of members of the wage-earning class normally employed, and (4) employment of members of the wage-earning population not normally working. The total wages paid in industrial establishments takes account of all these factors. Pay-rolls, not wage rates, are an index of the buying power of the wage-earning class.

A full discussion of the buying power of the wage-earning class during the war must involve a consideration of the following points: (1) changes in the total wages received; (2) changes in the purchasing power of the dollar; (3) increase in the wage-earning population; (4) withdrawal of men and boys into the army and the navy; (5) effect of this withdrawal upon the per capita consumption needs of the remaining population; (6) influx of agriculturalists into industrial work; and (7) determination of normal working-class buying power in order to ascertain whether or not the buying power of this group was above or below normal during the war.

The following study is based on the data furnished by the *Labor Market Bulletins* of New York State and the reports on "Employment in Selected Industries" published each month in the *Monthly Labor Review* of the United States Bureau of Labor Statistics. The New York data cover 55 industries. Reports are received from representative firms in each of these industries, and the firms reporting employ approximately one third of all the employees engaged in manufacturing in New York State.[1] The data furnished by the United States Bureau of Labor Statistics cover representative firms in 13 manufacturing industries in various parts of the country. These 13 industries employ slightly more than one third of all the persons engaged in manufacturing in the United States. The representative firms from these 13 industries which report to the Bureau of Labor Statistics employ nearly one tenth of all the persons engaged in manufacturing in the United States.

The data furnished by these two bureaus may safely be taken to represent conditions for the industrial wage-earning population. With regard to the New York data the Harvard Committee of Economic Research has this to say: "According to an investigation recently completed for the Committee on Economic Research, employment conditions in New York reflect with great accuracy those in the entire industrial section of the United States."[2] This is borne out by the closeness with which the New York data parallel the data of the United States Bureau which cover a widespread area, in fact most of the important industrial states of the union.

Table I gives the index numbers for total wages paid in representative factories in New York State and in the United States. The New York index numbers were constructed from the relatives given for each month in *Special Bulletin No. 85* for the years 1914–16, and in each issue of the *Labor Market Bulletin* for the remaining period. The United States relatives are a simple average of the index numbers of total wages paid in each of the 13 industries.[3] The base for the New York figures is June, 1914. The base for the figures for the United States as given in the *Monthly Review* is January, 1916. The United States relatives were made comparable to the New York figures through the medium of the New York index number for January, 1916, which was 116. Each of the United States figures was multiplied by 1.16 on the assumption that the United States figures had risen approximately as high by January, 1916, as had the New York figures. The remarkable closeness with which the two series parallel each other throughout 1916–20 would warrant this assumption.

The index numbers of total wages paid, however, serve merely as a starting point for our discussion. They tell us nothing about the real buying power of the wage-earning population during the war. The enormous increase in the amount of the pay-roll was largely due to the depreciation of the dollar. Inasmuch as we are interested in the buying power of the wage-earning class this depreciation should be measured in terms of the retail prices of the things that go into the wage-earners' budget. In short, for our purposes the depreciation of the dollar may properly be measured by the changes in the cost of living. The index numbers of cost of living given in Table I were constructed from data appearing in the *Monthly Labor Review* for October, 1919, and July, 1921. The changes in the cost of living as quoted in the *Review* are for June and December of each year. From these figures the mean for the first and the last half of each year was calculated. An average of these two figures for each year was then taken. This would give the average cost of living for the year.

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[1] See *Special Bulletin No. 85*, Bureau of Statistics and Information, Department of Labor, New York State.

[2] Special Letter, October 8, 1921, on "Industrial Employment," p. 3.

[3] The *Monthly Labor Review* for May, 1919, pp. 186–7, gives the index numbers for all the industries from January, 1916, to March, 1919, and for seven industries for each of the months of 1915. Index numbers for the remaining period were worked up from the original data published in each *Monthly Review*.

TABLE I

Year	Total wages paid (June, 1914=100)		Cost of living (1914=100)	Total wages paid in terms of 1914 prices (June, 1914=100)	
	New York State	United States		New York State	United States
1915............	100.7	101.6	102.3	98.4	99.3
1916............	131.2	131.3	109.5	119.8	119.9
1917............	156.2	159.2	129.0	121.1	123.4
1918............	197.0	196.5	156.3	126.0	125.8
1919............	212.7	222.1	179.4	118.6	123.8
1920............	263.5	263.3	205.1	128.5	128.4

We are not greatly interested, however, in the total buying power of the wage-earning class as a whole, because that would naturally increase with the growth of population, and such an increase would in no way indicate any improvement in the economic condition of labor. We wish rather to know the changes in the per capita buying power. We are referring here to the buying power of each member of the wage-earning population including those not gainfully employed. If, for example, the wage-earning population increased 10 per cent while the total buying power also increased 10 per cent, there would have been no change in the per capita buying power. We must therefore take account of the continuous increase in the wage-earning population.

According to the preliminary data of the Census Bureau the gainfully employed persons in the United States increased from 38,167,336 in 1910 to 41,609,192 in 1920, an increase of 9 per cent. The total population, however, increased 14.9 per cent. The greater increase of the total population implies a decrease in the proportion of the population gainfully employed. This decrease points to an improved standard, since, among other things, it indicates less child labor. It is not likely that this development has been more marked in the industrial wage-earning group than in the other economic groups, since child labor had already been greatly reduced, especially in the northern states, by 1910. With the development of higher educational standards, particularly in the rural districts, the tendency has probably been at least as marked among farmers, small independent proprietors, and the lower salaried people. So far as the professional classes are concerned, standards have been raised and the age of admission is higher. In the absence of accurate information we will assume that the proportionate increase of the total industrial wage-earning population as compared to the increase of the industrial wage-earners gainfully employed was the same as obtained for the population generally. According to an estimate of the Harvard Committee on Economic Research based on preliminary data of the Census Bureau, the persons employed in manufacturing and mechanical pursuits in 1920 were approximately 12,000,000.[1] This would amount to an increase of 12.6 per cent over 1910. Applying the proportion referred to above, we conclude that if the total gainfully employed increased 9 per cent while the total population increased 14.9 per cent, the manufacturing population must have increased 21 per cent, since the persons employed in manufacturing increased 12.6 per cent. Since the data used in this study are concerned with manufacturing industries, we may properly assume that the industrial wage-earning population, in the sense in which we are here using the term, increased 21 per cent from 1910 to 1920. The index numbers given in Table II are constructed on this basis. Because of the increasing industrialization of the country it seems reasonable that the wage-earning population should increase more than the population generally.

TABLE II

(June, 1914=100)

Year	Industrial wage-earning population	Per capita buying power New York State	Per capita buying power United States
1915	101.7	96.8	97.6
1916	103.4	115.9	116.0
1917	105.2	115.1	117.3
1918	106.9	117.9	117.7
1919	108.7	109.1	113.9
1920	110.4	116.4	116.3

The total amount of real wages received by the wage-earning population may now be reduced to a per capita basis by dividing the index numbers of total wages paid (in terms of 1914 prices) by the index numbers of the wage-earning population for the corresponding years. The result appears in Table II.

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[1] Special letter, p. 6.

Still other factors must be taken into account. A large number of men and boys from all walks of life were drawn away from productive activity into the service of the army and the navy during the years 1917–19. The inductions into the army and the navy and subsequent withdrawals during the years 1917–19 constitute an average loss from productive life for each year as follows:[1]

Year	Number in service
1917	414,583
1918	2,604,000
1919	1,334,833

The average for the three years is 1,451,139. This amounts to 1.4 per cent of the entire population. The draft presumably affected all classes of the population alike. We may, then, assume that the wage-earning population was reduced 1.4 per cent on the average for the three years 1917–19, and that the per capita buying power was, therefore, 1.4 per cent greater than would have been the case had this military population had to be supported out of the wages actually received in industrial establishments during those three years. This is, however, on the assumption that the males who entered the service were "average" individuals in a normal population. This assumption is, of course, not sound, and the above figure, therefore, needs to be corrected. The withdrawal of a large number of adult males appreciably affected the structure of the remaining population as to sex and age distribution. Since the consumption needs vary greatly with sex and age, that factor must be taken into account. This necessitates a study of the normal structure of the population, and a comparison of the consumption needs of an "average" individual in a normally constituted population with the consumption needs of the average male inducted into the service. In 1910 the age distribution of the population in the United States was as follows:[2]

TABLE III

Ages	Per cent of population	Consumption needs in terms of "ammains"[a]
Under 5 years	11.6	0.261
5 to 14 "	20.5	0.448
15 to 24 "	19.7	0.874
25 to 44 "	29.1	0.855
45 to 64 "	14.6	0.767
Over 64 "	4.3	0.692

[a] Sydenstricker and King, "The Measurement of the Relative Economic Status of Families," *Quart. Pub. of the Amer. Stat. Ass'n.*, Sept., 1921, p. 854.

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[1] "Annual Report of the Secretary of War," 1919; *Statistical Abstract* for 1919 and 1920.

[2] *Census of 1910*, "Population," Vol. I.

The last column of the above table shows the consumption needs of each age group in terms of "ammains." An ammain represents the consumption needs of an adult male at the age when his consumption needs are the greatest. The ammain figure for each age group in the table above is the median for that age group as given by Sydenstricker and King, the median figure for males and females being averaged for each group. From the above table the weighted averaged consumption needs of a normal population in terms of ammains was computed. This figure was found to be 0.686. The average consumption needs of the men inducted into the service was next computed. The ages ranged from 18 to 29 inclusive. The simple average of the ammains for these ages was found to be 0.982. It therefore appears that the average consumption needs of the men entering the service was the equivalent of 1.432 times the average consumption needs of the population generally. The effect of the induction of these men into the service was therefore 1.432 times greater than their actual number would indicate. The withdrawal of 1,451,139 adult males had the same effect on the consumption needs of the population as though 2,078,031 "average" individuals or 2 per cent of the population had been withdrawn. We may conclude, then, that the per capita buying power in 1917–19 was 2 per cent greater than would have been the case had the industrial wage-earners inducted into the service had to be supported out of the wages actually received during these years.

In the foregoing discussion it has been assumed that the changes in total wages paid in the representative factories were due entirely to the following variables: (1) changes in wage rates; and (2) changes in employment due to (a) over-time, (b) increased employment of industrial wage-earners normally working, and (c) employment of members of industrial families not normally working. As a matter of fact this is not entirely true. Another variable was the influx of agricultural laborers into industrial work. There is no accurate information as to the extent of this influx. Hornell Hart[1] says that at the peak of the demand for labor in 1917 probably over a million agricultural laborers were absorbed in industry. That would mean, according to his figures, an addition of 3.3 per cent to the supply of urban workers. But the influx amounted to little or nothing at the beginning of 1917, and there was a back flow toward the end of the year. The average addition for the entire year must certainly have been less than 2 per cent of the wage-earners gainfully employed. For the years 1918 and 1919, with the competing high wages for farm labor, it is likely that the percent-

[1] *Fluctuations in Unemployment in Cities of the United States, 1902 to 1917.* Helen S. Trounstine Foundation, Cinninnati.

age was at least no higher. At the most, then, we should not discount the 1917–19 figures given in Table II by more than 2 per cent because of this influx of agricultural labor.

The gain accruing from the reduction of the wage-earning population during the war years was probably offset, therefore, by the fact that a portion of the wages which we have assumed were received by the regular industrial wage-earning population was really received by the agriculturalists temporarily engaged in industrial work.

So far we have been discussing the purchasing power of the industrial wage-earning class during the war years as compared to June, 1914. But June, 1914, was a period of deep depression, of great unemployment, and, in all probability, of a considerable amount of short-time work. The purchasing power of labor in June, 1914, was therefore very much below normal. What we really want to know is this: Was the purchasing power of labor during the war years above or below normal? In order to answer this question we must find a normal base. June, 1914, is not a normal base.

Ordinarily, the way to find a normal base would be to take an average for a number of years prior to the war which would include one or more complete waves of the business cycle. That method, however, is impossible in this case because we do not have the pre-war data. The New York figures start with June, 1914, and the figures for the United States start with January, 1915. The writer therefore sought to get at the problem by asking the question: How far was June, 1914, below normal? If it was 10 per cent below normal, obviously the index number for June, 1914, should stand at 90 instead of at 100, and the index numbers given in the tables above should be correspondingly reduced. The problem was to ascertain how far June, 1914, was below normal as to total wages paid. Since in pre-war times wage rates were not altered greatly by short periods of depression, substantially the only thing that did appreciably effect the total wages paid in June, 1914, was the condition of employment. Unemployment and short-time work reduced the total wages paid. The condition of employment can, in turn, be measured by industrial conditions generally. How far were industrial conditions generally below normal in June, 1914?

I have taken three indexes of industrial conditions in order to determine how far the year 1914 was below normal. They were as follows: (1) the index of production of manufactures, 1902–16,[1] (2) percentage of employment in cities in the United States, 1902–16,[2] and (3) railroad gross earnings, 1902–16.[1] The period 1902 to 1916 includes four waves of the business cycle. The period starts and ends with business on the upward swing.

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[1] E. E. Day, "The Measurement of Variations in the National Real Income." *Quart. Pub. of the Amer. Stat. Ass'n.*, March, 1921, p. 555.

[2] Hart, *op. cit.*, Vol. I, No. 2, p. 48.

It was assumed that the secular trend or the line of regression for each curve would indicate the normal condition for any year. The average for the entire period would certainly not indicate the normal condition for any one year such as 1914, for example, since a marked trend appears in each case with the single exception of employment. In the case of employment there is no marked trend owing to the fact that the figures are the percentage of the total available supply of labor employed in each year. Since there is no trend in this case, the simple average for the entire period gives very nearly the same result as the secular trend. The average percentage of employment for the entire 15 years is 89.7, while the secular trend shows a percentage for 1914 of 89.2.

The line of regression was found by the method of moments, the following simultaneous equations being used to find m and b:

$$\Sigma y = m\Sigma x + nb$$
$$\Sigma xy = m\Sigma x^2 + \Sigma xb.$$

The line of regression was then found by substituting the values found for m and b in the equation $y = mx + b$. The figures for y for each year would give us the secular trend, and the values for y for the year 1914 would give us the normal which we are seeking to establish. Table IV compares the values for y for 1914 with the actual figures for that year.

TABLE IV

Item	Actual figure for 1914	y, or normal for 1914	Degree to which 1914 was normal
Production (1899=100)	171.4	187.47	91.4%
Employment (per cent of supply employed)	84.2	89.25	94.3%
Railroad gross earnings (per mile)	12.3	13.14	93.6%

Taking a simple average of the three indexes of industrial conditions we find, then, that 1914 was 93 per cent normal, or 7 per cent below normal. No doubt the employment index understates the extent to which the year was subnormal. This is due to the fact that a slack period in production shows itself not only in unemployment, but also in short-time. However, the average would have been but slightly lower if the employment index had been omitted.

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[1] Reports of the Interstate Commerce Commission.

It thus appears that the year 1914 was approximately 7 per cent below normal. The single month of June, 1914, however, is the base for the figures used in this study. It becomes necessary, therefore, to determine to what extent this particular month was below normal. Monthly figures for production are not available, and the monthly figures for railroad gross earnings are useless because of the tremendous seasonal fluctuations to which they are subject. Certain facts may be adduced, however, to show that industrial conditions in June, 1914, were approximately similar to conditions obtaining on the average for the year 1914. Take, for example, the percentage of employment according to Hart's figures. In June, 1914, 84.6 per cent of the available supply of labor was employed, while the average for the year was 84.2 per cent. Production of pig iron for June was 1,918,000 tons, while the average for the year was 1,921,000 tons.[1] Industrial conditions for June were not only average, they were also median. Depression, it appears, was somewhat greater during the last half of the year than had been true of the first five months of the year. The average monthly production of pig iron from January to May was 322,000 tons in excess of the average monthly production from July to December. The percentage of employment averaged 84.8 from January to May, while the average was 83.4 from July to December. It seems reasonable to suppose that the index number representing industrial conditions for June, 1914, would not differ materially from the index number representing industrial conditions for the year 1914 as a whole.

From the above discussion it is clear that index numbers based on June, 1914, give an exaggerated impression of the increase in the buying power of labor during the war period. June, 1914, as well as the year 1914 as a whole, was about 7 per cent below normal in production and in employment, including short-time. It follows that the current buying power of labor in June, 1914, was probably about 7 per cent below normal. The buying power index numbers given in Table II should therefore be reduced 7 per cent. This has been done in Table V,

TABLE V

PER CAPITA BUYING POWER OF LABOR, 1915-20

(100=Normal)

Year	New York State	United States
1915	90.0	90.8
1916	107.8	107.9
1917	107.0	109.1
1918	109.6	109.5
1919	101.5	105.9
1920	108.3	108.2

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[1] Babson's Statistical Tables and Charts.

which gives, as nearly as can be ascertained, the extent to which the per capita buying power of the wage-earning population varied from normal during the years 1915–20.

The per capita buying power of the wage-earning class during the years 1916–18 appears, then, to have been on the average 8.5 per cent above the normal per capita buying power of labor in pre-war days. How can this be accounted for in view of the apparent actual decrease in real wage rates shown, for example, by Mr. Douglas and Miss Lamberson for the years 1915–18?[1] In answer to this question the writer would suggest two points:

1. The decrease in real wage rates shown in the study referred to above is probably somewhat exaggerated so far as the years 1916–18 are concerned. The study consists mainly of union wage scales. The figures therefore correspond closely to the index numbers of union wage rates given in *Bulletin No. 286* of the Bureau of Labor Statistics, p. 21. There can be little doubt that union wage scales lagged considerably behind the actual wage rates paid generally. A more comprehensive study of wage rates for the war period is needed. But while further study may show that the decline in wage rates in terms of purchasing power was not quite so great as the above-mentioned investigation would indicate, the broad conclusion that real wage rates declined up to and including 1918 is likely to be sustained. Mr. Douglas suggests[2] that wage rates probably caught up with the cost of living by 1919.

2. Even though wage rates lagged behind the cost of living during 1915–18, the increase in the per capita buying power of labor during the war years can readily be explained by over-time and over-time bonuses, full employment for those regularly working, and the employment of members of the family not normally working.

Take the matter of over-time. Mr. Douglas says that he is "still in doubt as to whether the purchasing power of actual weekly earnings including over-time increased or decreased during that time," *i. e.*, up to and including 1918. This study would indicate that average weekly earnings including over-time did actually keep pace with the cost of living.

Consider now the employment of members of the family not normally working. The following table indicates the extent of that excess employment over and above what appears to have been normal during the pre-war period. It will be remembered that the percentage of the total available supply of labor employed in 1914 was 5.7 per cent below normal. The original index numbers were correspondingly reduced so that the figures given below show the variations from normal. The original index numbers were first reduced to a per capita basis by dividing them by the index numbers of the industrial population, and then reduced to the pre-war normal base as indicated above. The table therefore indicates the extent to which per capita employment was above or below the normal pre-war level.

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[1] Paul H. Douglas and Frances Lamberson, "The Movement of Real Wages 1890–1918," *Amer. Economic Rev.*, Sept., 1921, pp. 409–426.

[2] "An Examination of the Wage Statistics of the National Industrial Conference Board," *Quart. Pub. of the Amer. Stat. Ass'n.*, Sept., 1921, pp. 893–904.

The original figures were for "total employees" as given in the *Labor Market Bulletins* of New York State, and "number on pay-roll" as given in the *Monthly Review*. The index numbers for the United States were constructed by summating the "number on pay-roll" for all the 13 industries.

TABLE VI

INDEX NUMBERS OF PER CAPITA EMPLOYMENT, 1915-20

(100=Normal)[1]

Year	New York State	United States
1915	91.2	92.3
1916	104.2	102.5
1917	107.6	106.4
1918	107.4	104.8
1919	98.7	97.0
1920	100.8	97.6

If the index numbers for per capita buying power are compared with the index numbers for per capita employment, it will appear that a large part of the excess per capita buying power of the wage-earning population during the war years was due to the employment of members of industrial families not normally working. Since there was in addition considerable over-time, it appears reasonable that real wage rates decreased from 1915 to 1918 as Mr. Douglas and Miss Lamberson show. It will be noticed on the other hand that in spite of the decline in employment in 1919 and 1920 a considerable excess buying power is indicated for these years, especially for 1920. Since over-time could not have been an important item for these years, wage rates must have overtaken the cost of living.

[1] It should be noted that this table is intended to show how much of the increased buying power of labor during the war years was due to an excess of employment over what appeared to be normal *before the war*. It does not show the extent to which employment was in excess of normal *for each particular year*. The reason for this is that the proportion of the population gainfully employed declined during the period under consideration. A table showing the extent to which employment was above or below normal in each of the years 1915-20 should be constructed by dividing the index numbers for the total number on the pay-roll by the index numbers showing the normal increase in persons gainfully employed in manufacturing, and not by the index numbers showing the increase in the manufacturing population. The following table is appended to show the extent to which employment was in excess of what could properly be considered normal for each year in view of the decline in the proportion of the total manufacturing population which was gainfully employed.

Year	New York State	United States
1915	91.8	93.0
1916	105.6	103.8
1917	109.7	108.4
1918	110.2	107.5
1919	101.9	100.2
1920	104.7	101.4